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LAND SUBSIDENCE IN A CALIFORNIA COUNTY: THE LEGAL ISSUES

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Abstract

In the early years of this century subsidence of land surface in Santa Clara County occurred by reason of intensive pumping of groundwater for irrigation. Under California law, there is no effective State control of groundwater extraction. There are, however, private rights in groundwater as a common resource. A person injured by overpumping may sue upon an allegation that the pumper is taking more than his share -- the right to groundwater being not a right to a stated amount but rather to a share of the available supply. In addition, a local public agency having the power to tax the activity of withdrawing groundwater can by this means exert a measure of control. In the absence of statewide regulation, local public agencies have been moving to secure regulatory powers which include direct control as well as taxation of groundwater extractions.

Land Subsidence in Santa Clara County

The Santa Clara Valley is the extension southerly and easterly of San Francisco Bay. The south arm of the Bay is simply a drowned valley containing the former thread of Coyote Creek, the area's major watercourse. The valley is drained by a number of smaller creeks rising in the foothills to the east and west. These have in the course of geologic time shifted about and laid down their silts and gravels so that under the valley today there are many lenses, layers, and fingers of material coarse enough to store water readily. In the north part of the valley these aquifers all incline toward the Bay, in the south toward Pajaro River which is tributary to Monterey Bay and the Pacific Ocean. As the old rivers flattened they dropped progressively finer and finer materials. Thus, we have receptive gravels on or close to the surface at the base of the surrounding hills; near the Bay we have tight clays overlying these water bearing bodies.

In the Spanish and Mexican colonial period there was no substantial use of groundwater. Dry farming and raising cattle for hides was the rule; there was very little ditch use.

After statehood, more intensive farming began. However, not until about the turn of the century with the invention of the deep well turbine pump, did farmers begin their reliance on wells and begin creating the problem of overdraft and the necessity for groundwater management.

By 1913 the lowering of the valley's water table had become noticeable and a few leaders began the long effort to reverse it. After the Great War, which had preoccupied everyone, efforts were made to organize a public agency or "district" to do something about the problem.

A word of explanation: "Districts", as the term is used in California, are a form of local public agency created by the State Legislature to perform specialized services and exercise limited powers within a described area. They have specified sources of revenue; (taxes and assessments or charges) and they are self-governing by an elected body. They are, in effect, public corporations.

By 1929 the conservative and hardheaded majority of the prune and apricot growers of the Santa Clara Valley had been convinced by a series of experiments that you could actually put water underground and that it was vital to them to do so. Artificial recharge had been proposed in detail in a report made in 1921 by a pair of engineers hired by a local association. But until things got really bad, the means were not thought practical or credible, or if credible were seen as wildly expensive.

The means are entirely familiar today and consist of catching winter flood flows in conservation dams and releasing them in the summer to the gravels at the base of the hills, the entrance to the aquifers. Percolation movement is then governed by gravity and the character of the receiving strata.

The new District, formed in 1929, built a number of such dams and began the process of artificial recharge of the underlying basins. The process included, by necessity, scheduled releases or "pass throughs" of flows sufficient to satisfy vested rights downstream. Percolation in the stream beds was encouraged by low check dams bulldozed up in the spring and washed out in the fall. It also found, bought and developed off-stream pervious areas for use as percolation ponds. Riparian owners were allowed to buy a supply of water thus appropriated and released. This initiated a principle we are still working on, namely, that the basin is directly assisted by any substitution of surface water for a pumped supply.

This local program worked spectacularly well. By 1942 the well levels moved up. Artesian flows in the bayward pressure zone were restored. However, under intensified use of water during World War II and thereafter -- everyone in the country seemed to be moving to Santa Clara County -- the depth to water again lengthened and a condition of overdraft became chronic and growing.

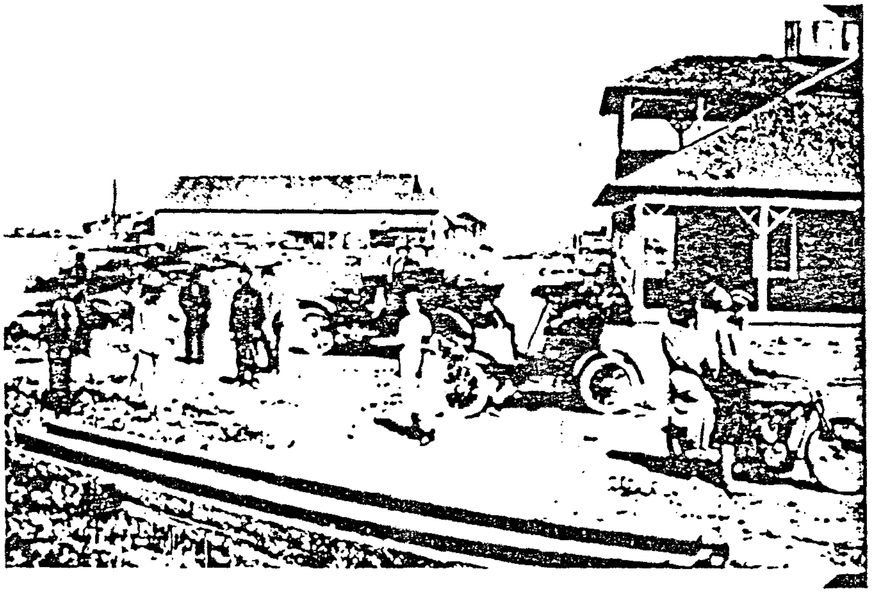
In these circumstances it was decided that water must be imported. Some of our cities lying along the rim of the Bay have access to the City of San Francisco's "Hetch Hetchy" line which brings good water from the Sierra Nevada. They began buying some and to the extent they did and do they leave water underground for others who cannot buy from this source. The federal statute, called the Raker Act, which permitted the City to store water in a national park forbids sales for resale or for irrigation and also limits uses to domestic or municipal. Hence, this supply cannot be put underground since a major use of water from wells is agricultural and since groundwater is pumped for commercial sale.

The California State Water Project provides another source. We import about 100,000 acre-feet a year, by purchase from the state. This water we can percolate or treat and serve wholesale. We do both. In either event we are conserving water underground.

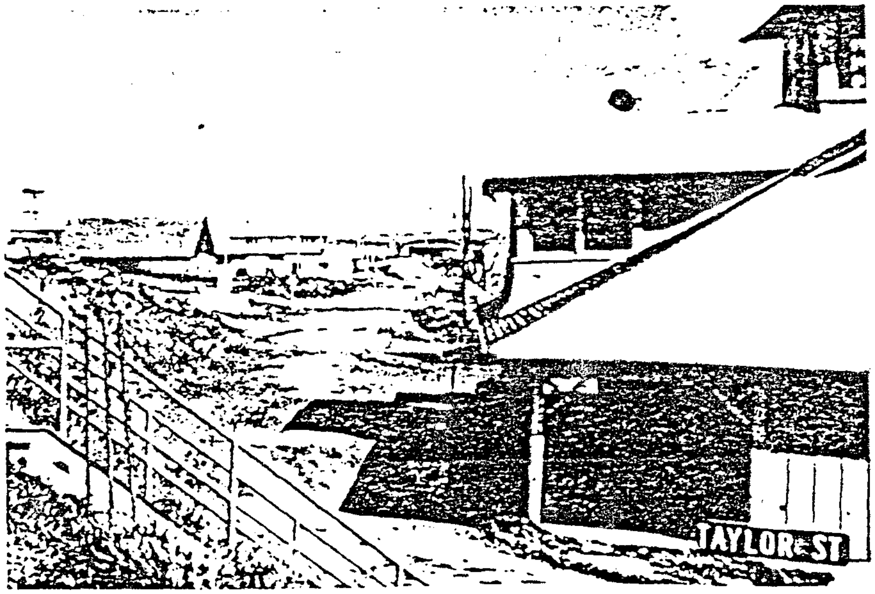
A third source will be, eventually, a unit (the San Felipe Division) of the Federal Central Valley Project. This is expected about 1987 and, again, we can serve it on the surface or place it underground for pumpers to use, or both.

A falling water table with consequent dry wells or expensive well deepening is not the only nor perhaps the worst result of long continued overdraft of groundwater. Land surface subsidence in northern Santa Clara County has occurred over an area of some 622 km^2. Loss of elevation in downtown San Jose, the principle city, is 4 to 4.25 meters. Lands directly littoral to San Francisco Bay have sunk as much as three meters. The result for the people attempting to live or do business on Bay front property can be imagined. A dramatic illustration of the condition will be seen in the pair of contrasting photographs shown below.

Surface subsidence took place between 1912 and 1969 when it was brought under control. A graphic representation of the course of the phenomenon is shown as Figure 1. A correspondence between a program of artificial recharge of the underground and control of subsidence is apparent. Subsidence in this Valley was carefully observed and measured by the



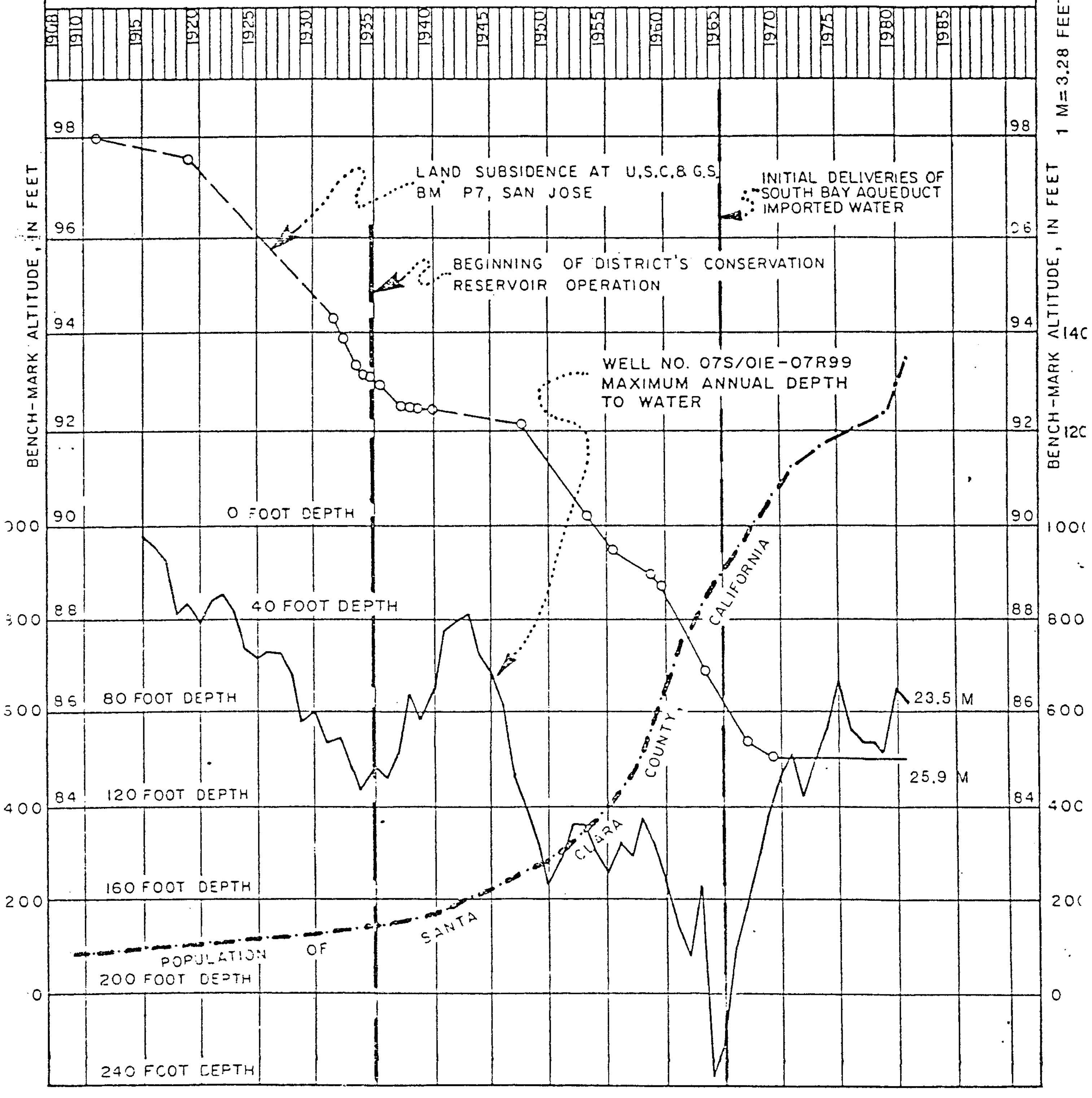
SOUTH BAY YACHT CLUB - 1914
San Francisco Bay is to the left



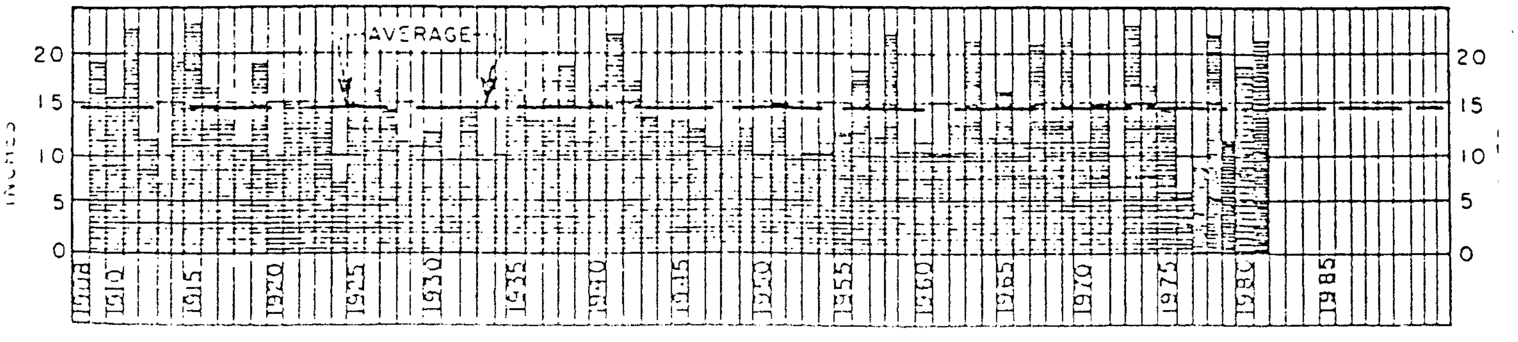
SOUTH BAY YACHT CLUB - Today
Note 3.66 meter high levee on the left

FIGURE 1

SANTA CLARA VALLEY WATER DISTRICT
RAINFALL, AVERAGE DEPTH TO WATER, LAND SUBSIDENCE, POPULATION



RAINFALL-CITY OF SAN JOSE, CALIFORNIA-WEATHER BUREAU RECORDS



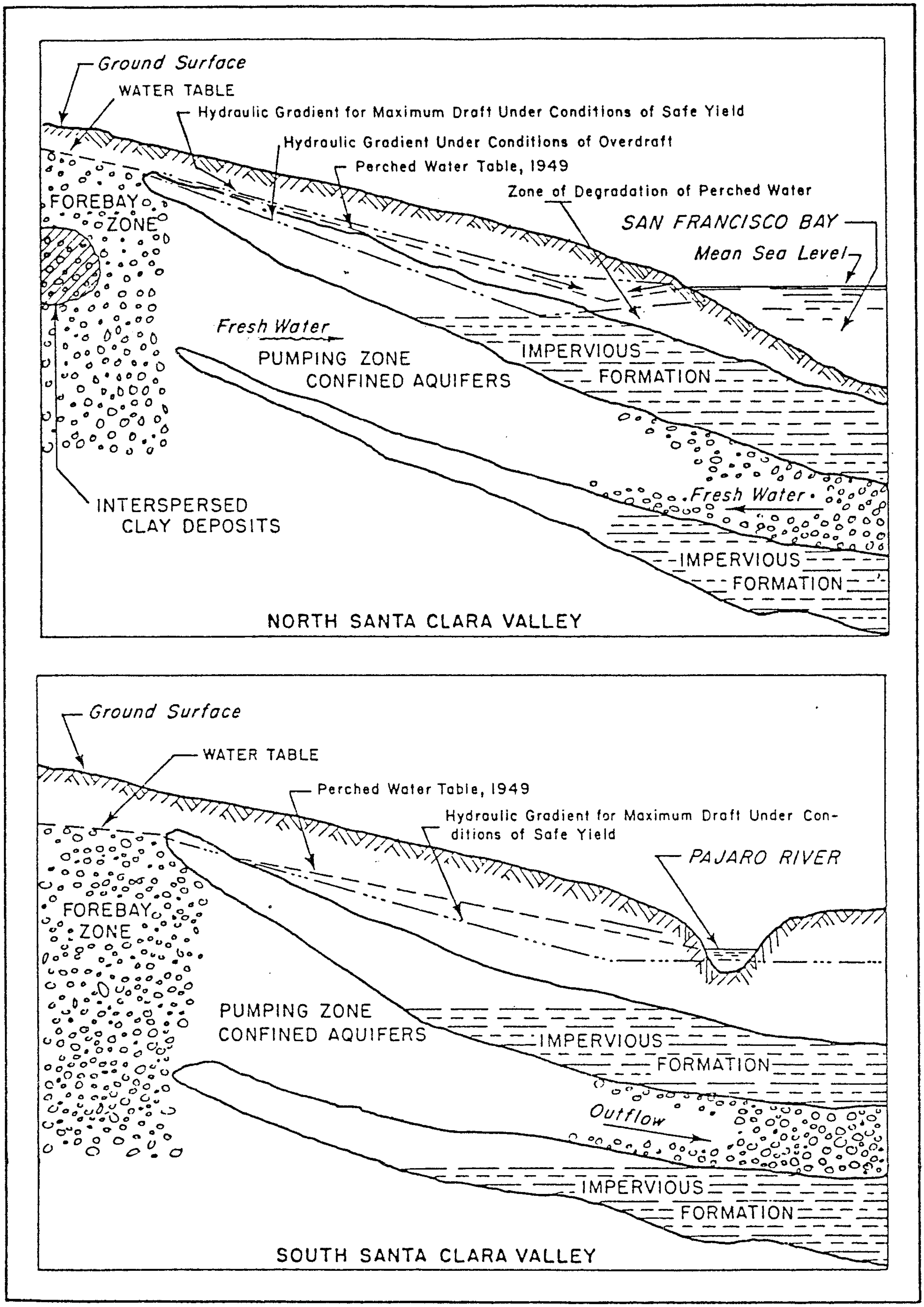

Ground Surface
WATER TABLE
Hydraulic Gradient for Maximum Draft Under Conditions of Safe Yield
Hydraulic Gradient Under Conditions of Overdraft
Perched Water Table, 1949
Zone of Degradation of Perched Water
SAN FRANCISCO BAY
Mean Sea Level
FOREBAY ZONE
Fresh Water
PUMPING ZONE CONFINED AQUIFERS
IMPERVIOUS FORMATION
Fresh Water
IMPERVIOUS FORMATION
INTERSPERSED CLAY DEPOSITS
NORTH SANTA CLARA VALLEY
Ground Surface
WATER TABLE
Perched Water Table, 1949
Hydraulic Gradient for Maximum Draft Under Conditions of Safe Yield
PAJARO RIVER
FOREBAY ZONE
PUMPING ZONE CONFINED AQUIFERS
IMPERVIOUS FORMATION
Outflow
IMPERVIOUS FORMATION
SOUTH SANTA CLARA VALLEY

Figure 2. Cross Section of Ground Water Reservoir

Source: California Department of Public Works, Division of Water Resources, Santa Clara Valley Investigation. (Sacramento: State Print Off., June, 1955) (Water Resources Board Bulletin No. 7.)

United States Geological Survey. It is an interesting fact that it was the first in the United States to be recognized as having been caused by overdrafting the groundwater supply. See Poland (1978): reference should be made to this thorough investigation and report for a technical description of the process. In general it appears to be established that surface subsidence may follow, and in the Santa Clara Valley did follow the loss of pressure within confined aquifers by reason of over pumping. The loss caused compression of the lenses made up of clays or other fines in such bodies. The clay cap, no longer supported, subsides under the influence of gravity. Unhappily the loss of elevation is permanent, no feasible method of reversing the process is known. What can be done is to recharge the gravelly portions of the water bearing bodies, the "ground water reservoir" by percolation in the elevated forebay zone, thus halting the compression process. See Figure 2. Manifestly the means of doing so include artificial introduction of groundwater to augment the natural effect of rainfall as well as lessening by every means the rate of withdrawal. In the Santa Clara Valley we are doing both through the use of a local public agency, the Santa Clara Valley Water District. In what follows we will examine the law governing groundwater and consequently the law governing land surface subsidence control.

Groundwater Law

The subject greatly exceeds, of course, the limits of this paper. We can do no more than briefly outline the historical basis of the law and its modern applications. We must be aware generally of rights to groundwater if we are to discuss its management with the objective of controlling land subsidence. We must ask who, if anyone, "owns" percolating groundwater.

The settled eastern shore of what became the United States began and continued for many generations as a British colony. Along with much else, we took our governing law from that country. When California was ceded by Mexico under the 1848 Treaty of Guadalupe Hidalgo and in due course was admitted as a state, the English Common Law was offically adopted as our basic rule in the absence of contrary statute. The Common Law is the product of a long history of individual decision making; basically it is judge and custom made. Lawyers attempting to predict what a court will do search out precedents, prior examples of what courts have done. Thus to find the law governing rights to groundwater, 19th Century English cases were consulted. These determined that, as an owner of land owns to the center of the earth, groundwater found in that theoretical prism is a part of that absolute proprietorship. The result was that a person injured by his neighbor who was over-pumping the common underground reservoir, or "basin", had no recourse in law.

In the 19th Century the judges and litigants had no understanding of groundwater and the notion of its absolute ownership was largely a confession of that ignorance. The California Supreme Court, better instructed in hydrogeology, has decreed a different rule. See Katz v. Walkinshaw (1903). The law now recognizes a groundwater basin as a common resource; that it is subject to abuse and depletion and that the injury occasioned by abuse should have a remedy. It is recognized that water moving on the surface or, more slowly, underground cannot be "owned" by any one. The right to water is a right to use it, after which the hydrological cycle continues. Rights to use the content of a groundwater basin are, under our law, shared among the owners of the surface. The primary right is held by an owner for use upon his overlying land. If there is any surplus others may pump and use the supply. If there is a shortage, these others, call "appropriators", are cut off first and among themselves, the rule requires that those last to begin pumping are cut off first. "First in time is first in right". Overlying owners have no priority based on time. If after appropriators stop withdrawing there is still a shortage, overlying owners must share the inadequate supply. Hence, the right of the overlying owner is called "correlative".

Those are the simple, straightforward rules. Unfortunately in a fact situation of any complexity they cannot be followed. The underground is a major source of supply in a country where surface streams are scarce, intermittent and unreliable. The uses of appropriators cannot be ended in that order. In a recent landmark decision of the California Supreme Court, Los Angeles v. San Fernando (1975), it was conceded that iron mathematical rules would have to yield to the inescapable fact that a major municipal supply could not simply be ended as practical matter; that equitable divisions outside the theory would have to be made in many cases.

Legal Issues

Since 1914 anyone in California wishing to take and use surface water who is not acting upon a riparian right (or other right established prior to 1914) must seek a permit from the State. Unlike most other western states, California has never extended this permit system to groundwater. Recently a Commission to Review California Water Rights Law was established by the Governor. After much study and extensive public hearings the Commission released its final report. The following statements are taken from the Summary (1978).

> "There are several types of problems related to overpumping, besides the problem that the groundwater supply in a given area may be exhausted. One example is seawater intrusion into fresh water acquifers, which occurs when groundwater extraction increases to the point that normal seaward movement of fresh water is decreased and seawater moves inland. Subsidence also results from overdraft.
>
> To deal with existing groundwater problems, the Commission recommends that legislation on groundwater management, the adjudication of groundwater rights, and conjunctive use of surface water and groundwater resources be enacted. Because of the various levels and types of existing management programs and the substantial differences in groundwater basin conditions and needs in the state, the proposed legislation allows for flexibility whenever possible.
>
> The basic premise of the Commission's proposed legislation is that local management if it is properly undertaken, offers the best opportunity for workable and effective control. Local entities should be given the primary responsibility and necessary powers to develop and implement management programs. The proposed legislation anticipates that areas that are already well-managed or that do not have critical groundwater problems will be "inactive", that is, they will not be required to have a designated groundwater management authority or a groundwater management program. Such areas, however, may choose to have the inactive classification removed in order, for example, to obtain the powers granted to groundwater management authorities. The Commission intends

> that the requirements of the proposed legislation not jeopardize working management efforts or require any unnecessary management actions."

The Commission suggested enactment of a statute to provide that local entities or districts in areas of critical overdraft be empowered to develop a groundwater management program for the area and perform groundwater management. If there were no suitable local entity, one was to be formed to be called a "Groundwater Management District". The necessary statute was never enacted principally because the law was to require that local programs be subject to state review. Agriculturalists, especially those in the great San Joaquin Valley -- an area of critical overdraft -- feared to permit any possibility of loss of local powers of decision over withdrawals.

In the absence of statewide legislation some local agencies have drafted and secured enactment of authority to management groundwater within their own boundaries. These are examples of such provisions:

Basin Equity Assessments. A governing board determines for each oncoming year the amount of groundwater that can be safely withdrawn from the basin. Each pumper is then allocated a percentage of that yield (based on past extraction records). A pumper who takes more than his allocation pays an assessment. A pumper who takes less receives a payment upon the same basis.

Withdrawal Permits. No one can extract groundwater without a permit from the district and the permit may be withheld or limited upon a finding that the basin is overdrawn. The district may also require that wells be located and properly spaced apart.

Groundwater Extraction Charges. An excise is laid upon the activity of extracting groundwater measured by amount withdrawn.

Direct Charges. The district may impose a charge upon each unit of land overlying a basin to support the district's groundwater management activity. This is not an ad valorem tax but is more in the nature of an assessment based upon the benefit conferred upon the ownerships by reason of management of their underground resource.

Where a local political body and its officers and employees have acquired power to regulate, the regulatory function becomes a matter of daily decisions, of judgment. It would be essential that the making of such decisions be protected from civil suit in order that the system can work. Thus, for example, a decision to deny a well permit to an orchardist might cause the death of his trees. If the decision was made without fraud or collusion, the agency should be immune from an action to recover damages. Such immunity is provided in California by general statutes insulating government from tort claims (with specified exceptions not pertinent here).

Private parties can and do sue each other upon an allegation that more than a legal share is being taken. The plaintiff can describe his harm, which may include subsidence of his land surface, and demand money damages or, more usually, an injunction limiting the extractions to a proper figure. We have seen that under California groundwater law the rights of overlying owners are correlative. However, there are crushing burdens on a litigant in such a suit when more than a very few pumpers are involved. The reason is that before it can be said that pumper A is taking more than his share we must find what pumper A's share is. In theory, at least, each overlying owner has a right to use water from the basin on his land and he may begin that use at any time. He does not lose his right by non-use or delay. The limits are that he cannot waste it and he must share a shortage. When may we say there is a shortage? When the safe yield is being exceeded. What is the safe yield? It has been defined as the maximum quantity of groundwater that can be withdrawn annually under a given set of conditions without resulting in a lowering of the groundwater level and eventual depletion of the supply. But this definition must be subject to the right to use the basin for storage through wet and dry periods; the right to fill it in the one and to drain it down in order to ride through the other. Thus there may be temporary intentional surpluses and lawful temporary deficiencies. Los Angeles v. San Fernando (1975).

If we can agree upon a safe yield, that yield is to be divided not upon the basis of use historically established but upon a basis of reasonable need. And all of this assumes that mere appropriators have been cut off -- a practical and political impossibility in most cases.

Such a legal process is called a groundwater basin adjudication and it will perhaps never again be attempted. The usual pattern today is professional neutral research which bases an agreement, application to a court to approve the agreement and installation of a court appointed "water master" to enforce it.

Groundwater Management in Santa Clara County

Local Management of Water -- surface, subsurface and flood -- is in the hands of Santa Clara Valley Water District. This is an example of the agencies I have mentioned, one created by the State Legislature to perform specified services within a described area. The District does not enjoy most of the useful powers which would permit direct control of the resource.

As I have stated, the District captures winter flood flows and percolates the supply into the underground. It imports large amounts of water and much of such water is also percolated. How can this constitute management? We seem to be devoting effort to replenishment of a groundwater supply and then abandoning it to the individual choice of every pumper.

As we lack the authority to control extractions by direct order, we must do it indirectly by suasion, by a system of rewards and punishment. The first tool to this purpose is the groundwater extraction charge. Legislation amending the District's governing act to permit the charge was adopted in 1962.

The groundwater extraction charge, or "pump tax" as it's often called, is in legal contemplation no more than a familiar excise. It lays a charge upon the activity of extracting groundwater and measures the charge by the amount extracted. It is not a sale of groundwater -- after all the overlying owner is presumed to have a right to take and use the percolating water beneath him. If you would nudge people into using surface water in order to preserve the underground for periods of surface water shortage, you will want to insure that groundwater is not measurably cheaper to use.

This is economic urging, often the best kind. Another form of such urging we have used is tax rebate. The legislative authority to do this was added to the District's Act at our request. Thus, an entity such as a city which imports water is rewarded by a rebate of a portion of the property taxes collected in its area upon the theory that that area does not benefit from groundwater replenishment as much as others which rely more heavily on that source. By the same token that area has, by importing, left more water underground.

The benevolent and beneficent manipulations by which we manage groundwater in the Santa Clara Valley depend on a decision agreed to by all concerned. This is called the Pricing Policy. The District, as I have indicated, does not merely restore and maintain the groundwater basins it overlies, it also buys, treats and wholesales massive quantities of surface water. We set the price of that surface water. The basic element of the pricing policy is the determination to view all water without regard to source (and hence without regard to varying costs) as pooled, as one supply. If we did not do that, if we related the price of water to its costs, we would find it impossible to get people to choose a more expensive supply, even though such a choice is greatly in their long range interest.

The thing is done with what could be called an "equalizer". We take the groundwater extraction charge (which is set each year by the Directors) as a basic user charge. To that figure we add a variable called the "treated water surcharge" and the total is made the cost to our wholesale customers of our potable water. The treated water surcharge is intended to produce a sum which is roughly equivalent to the per acre-foot cost to a pumper imposed by the groundwater extraction charge plus all his other costs of extraction, capitalized well, pump, energy and all. In such a situation he does not easily prefer pumping. He is prepared to switch to a surface supply as long as it is available and to rely on the basin storage for periods when surface supplies are short. And that is, of course, the idea.

You'll have seen that our groundwater management program represents a choice made. Presumably we could have let the condition of overdraft continue and worsen until only those with the deepest wells survived or until, as some economists urge, water is reserved by scarcity to its highest use. We could have instituted an adjudication and established all the relative rights. The first was politically impossible; the second takes too long and costs too much and would hve ended by sharing out a shortage. The methods we use are improvisations to approximate the control which we lack the power to impose directly. They work only because an imported supply can be offered in substitution.

In summary then, the Santa Clara Valley Water District is engaged in management of its basin (actually three interconnected basins). The process is indirect but roughly appropriate and effective: it depends on an ability to price water to the user in such a way as to induce conjunctive use and preservation of the groundwater resource. I have given examples above of more direct methods. We may be seeking and using them in the future. But as of today the process has worked and the result has been an end to land surface subsidence in Santa Clara County.

References

Governor's Commission to Review California Water Rights Law, 1978: Summary, p. 1-8.

Katz v. Walkinshaw, 1903, 141 Cal 116.

Los Angeles v. San Fernando, 1975, 14 Cal. 3d 199.

Poland, J. F., Land Subsidence in the Santa Clara Valley: Water Spectrum, Spring, p. 10-16.